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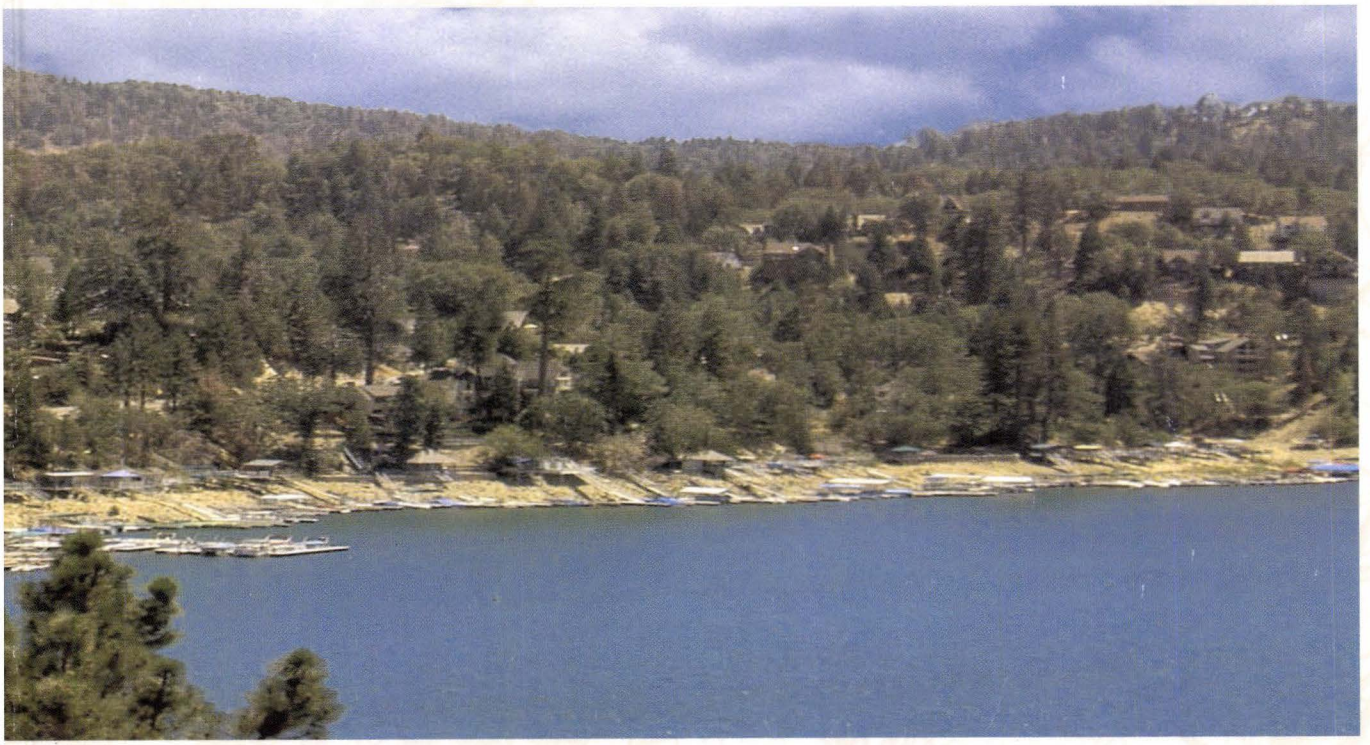
Social Science to Improve Fuels Management: A Synthesis of Research on Assessing Social Acceptability of Fuels Treatments



Wildland Fire Behavior & Forest Structure

Environmental Consequences

Economics

Social Concerns

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Preface

This document is part of the Fuels Planning: Science Synthesis and Integration Project, a pilot project initiated by the USDA Forest Service to respond to the need for tools and information useful for planning site-specific fuel (vegetation) treatment projects. The information addresses fuel and forest conditions of the dry inland forests of the Western United States: those dominated by ponderosa pine, Douglas-fir, dry grand fir/white fir, and dry lodgepole pine potential vegetation types. Information was developed primarily for application at the stand level and is intended to be useful within this forest type regardless of ownership. Portions of the information also will be directly applicable to the pinyon pine/juniper potential vegetation types. Many of the concepts and tools developed by the project may be useful for planning fuel projects in other forest types. In particular, many of the social science findings would have direct applicability to fuel planning activities for forests throughout the United States. As is the case in the use of all models and information developed for specific purposes, our tools should be used with a full understanding of their limitations and applicability.

The science team, although organized functionally, worked hard at integrating the approaches, analyses, and tools. It is the collective effort of the team members that provides the depth and understanding of the work. The science team leadership included Deputy Science Team Leader Sarah McCaffrey (USDA FS, North Central Research Station); forest structure and fire behavior—Dave Peterson and Morris Johnson (USDA FS, Pacific Northwest Research Station); environmental consequences—Elaine Kennedy-Sutherland and Anne Black (USDA FS, Rocky Mountain Research Station); economic uses of materials—Jamie Barbour and Roger Fight (USDA FS, Pacific Northwest Research Station); public attitudes and beliefs—Pamela Jakes and Susan Barro (USDA FS, North Central Research Station); and technology transfer—John Szymoniak, (USDA FS, Pacific Southwest Research Station).

This project would not have been possible were it not for the vision and financial support of Janet Anderson and Leslie Sekavec of the Washington Office Fire and Aviation Management staff.

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MAR - 1 2012

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Welcome

This is one of several publications to be developed by the public attitudes and beliefs team of the Fuels Planning: Science Synthesis and Integration Project. To gather information relevant to public attitudes and beliefs about fuels planning, we posed six questions. These questions were developed around the tasks and challenges faced by fuels treatments planners:

- What information and tools are available to help land managers and communities collaborate in developing fuels treatments programs?
- What information and tools are available to help managers work with communities to communicate the risk and uncertainty of fuels treatments projects?
- What information and tools are available to evaluate the social acceptability of fuels treatments?
- What information and tools are available to describe and evaluate the aesthetic impacts of fuels treatments?
- What information and tools are available to encourage more active involvement of private property owners in the fuels management process?
- What information and tools are available to help us understand and evaluate the social impacts of wildfire?

Teams of scientists from universities and public agencies across the country were formed to address each question. Collectively we became known as the social science teams. Each team had approximately eight weeks to produce a synthesis of science relevant to its question and an annotated bibliography that supports the synthesis.

While the focus of the national project was on the dry inland forests of the Western United States, the research synthesized by the social science teams was not limited geographically. We felt the research question being addressed was more important than the location of the research. In addition, we felt that research addressing the human dimensions of a variety of management objectives is potentially applicable to fuels management. For example, we assumed that information and tools developed in Minnesota to bring together communities and agencies in addressing watershed management collaboratively, across boundaries, are applicable to fuels management.

In this publication we present the findings of the synthesis on the social acceptability of fuels treatments. Manager fact sheets are available online at:
http://www.fs.fed.us/fire/tech_transfer/synthesis/social_science_team/fact_sheet_ss.htm

Further information of the larger project is available online at:
http://www.fs.fed.us/fire/tech_transfer/synthesis/synthesis_index

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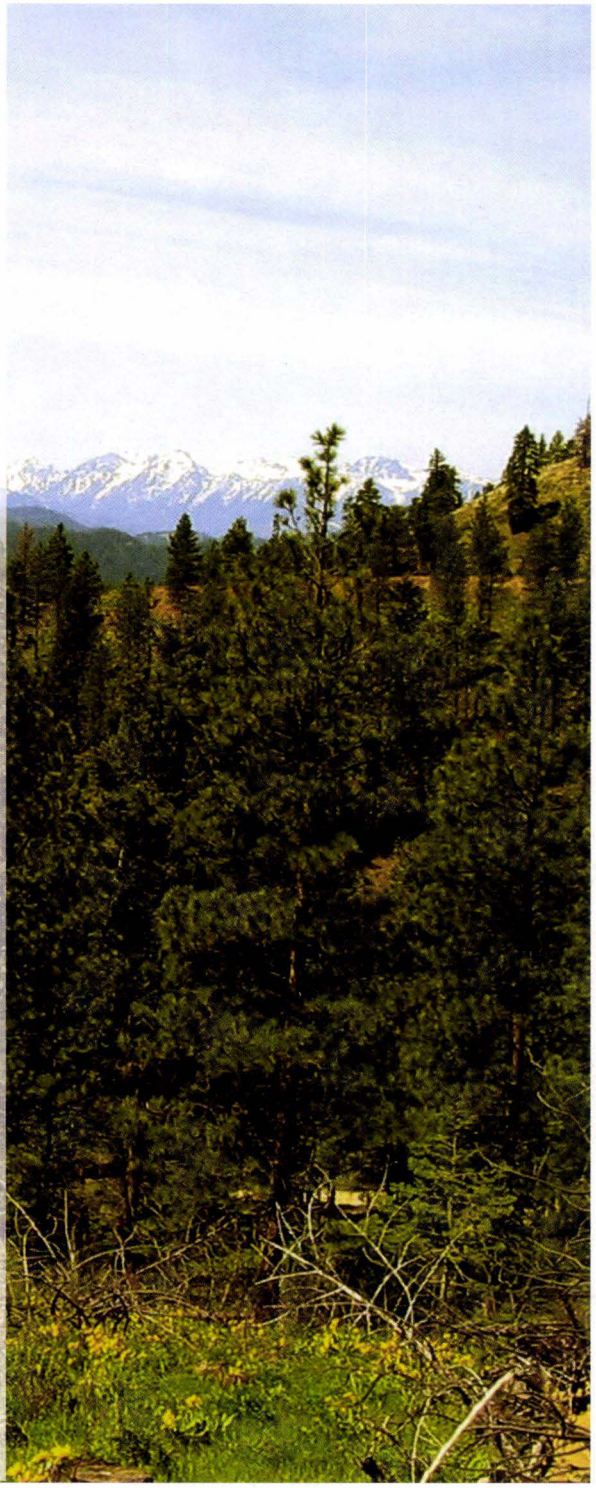

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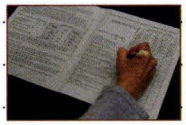
Introduction

When making decisions about fuels treatments, managers assess the biophysical impacts expected from the treatment. In planning and other decision processes, managers must also evaluate the treatment's social impacts. One general measure of social impacts is social acceptability. Social acceptability is based on value judgments by people, their notions of "goodness/betterness." For example, managers may be interested in answering the question "Do stakeholders judge treatment X to be more *socially acceptable* than treatment Y for reducing hazardous fuels?" An alternative question might focus on the management goal rather than the means of achieving that goal, for example: "Is it more socially acceptable to manage for fuels reduction or ecosystem restoration?" In this document we synthesize research relevant to evaluating the social acceptability of fuels treatments in the dry forests of the inland West.

A question often asked about social acceptability is how do we measure the "goodness/betterness" of a management action? One answer is by using proxies. A proxy is usually thought of as a person who

Measuring "Social Acceptability"

Three terms commonly used in studies of economics and psychology have meanings similar to or overlapping with the term "social acceptability":

- **Value or assigned value**–following Brown (1984) social acceptability might be characterized as a variant of value, or more properly assigned value
- **Utility**–a term traditionally used in economics and commonly represented as dollars or price
- **Subjective expected utility (SEU)**–a classical psychological/decision science term, often measured as preference or importance.

Social acceptability assessments often explicitly include assessments of means as well as ends, including how the management decision is made, who "wins" and who "loses," and how the treatment is implemented (e.g., by private companies for profit or by government agencies at taxpayer expense). In contrast to measures of utility, social acceptability is likely to be aggregated using a more holistic process where all attributes and considerations are somehow synthesized into a whole.

Although social acceptability is generally thought to reside in, or arise from individuals, those interested in social acceptability may want a more collective measure based on consensus among members of a "society." In measures of utility and subjective expected utility, aggregation is often done across individuals using sums or averages. The issue of how much each individual "counts" in this process is treated separately as an equity issue in economics. There are no clear prescriptions for aggregating social acceptability over individuals. Some form of "voting" may be appropriate in some cases, but more often dialogue, negotiation, and mutual learning/education are advocated as a way to meld individual judgments into a social/community consensus.

serves as the agent or substitute for someone else. A proxy for social acceptability is a characteristic or factor that can be described or measured and that substitutes for social acceptability. Think of the concept of forest health. There is nothing in the woods called forest health that can be measured; instead managers measure species diversity, regeneration, the volume of dead and dying trees, or some mix of factors that substitute for forest health. The same approach is used to measure social acceptability. There are a number of proxies for social acceptability, including perceived environmental quality, landscape quality, naturalness, scenic beauty, preference, satisfaction, importance or tolerance, and there are many methods for assessing these surrogates. In this synthesis we include research related to the description and measurement of proxies that can be used to assess social acceptability. For more information on scenic beauty and aesthetics, see Social Science to Improve Fuels Management: A Synthesis of Research on the Aesthetics of Fuels Management (Ryan, in press).

Shindler and colleagues (2002) offer a comprehensive discussion of social acceptability as it might apply in the context of forest management. For more discussion on that topic, go to appendix A. Few studies specifically measure or describe the social acceptability (or its proxies) of fuels treatments in the dry forests of the inland West. Because we are interested primarily in methods, we expanded the

Proxies for social acceptability are characteristics or factors that can be described or measured and that substitute for social acceptability. One proxy for social acceptability is scenic beauty.

Photo credit: David Peterson

The Proxy Issue

The proxy issue was recently addressed directly in a study by Ribe (2002) in which *scenic beauty* and *acceptability* for a common set of forest management outcomes were assessed and directly compared. Management practices in the forests of the Cascade and Olympic Mountains of Washington and Oregon were selected for study. The study sought participants who were likely to be familiar with the forest and management activities represented and who had recently been affected by forest management for the northern spotted owl (a locally and nationally notorious forest management controversy). More than 1,000 residents of Washington and Oregon were selected as participants. Participants were shown color slides of forest scenes (ranging from "wilderness" to "fresh clear-cuts and roads") and were asked to rate their scenic beauty (-5 to +5 scale, *very ugly to very beautiful*) or acceptability (-5 to +5, *very unacceptable to very acceptable*). To clearly distinguish the two scales/value concepts, acceptability was defined for participants as "how much the landscape shown is in a condition that is acceptable for a publicly owned and managed national forest" and they were encouraged to apply their "knowledge and sensibilities regarding forest management." Still, scenic beauty and acceptability ratings were very highly and positively correlated, and the study supports the notion that scenic beauty may be a suitable proxy for acceptability in this and similar contexts.

synthesis to include management of forest vegetation for any purposes, so long as there were at least reasonable parallels to "fuels management". For example, we included research that addressed public perceptions of various treatments associated with timber harvests or ecosystem management. A few articles that are somewhat further removed from fuels management were also included to illustrate specific methods that may be important assessment options. In every case, however, this synthesis focused on how the methods used in these studies might be applied to assess social acceptability of fuels treatments in dry forests of the inland West.

In many ways, this synthesis is a primer for social acceptability assessment. What will be obvious to the reader is that forest managers can use certain approaches to gather and analyze information related to social acceptability, but in many cases, a trained social scientist is necessary to ensure data quality and relevance. Although this document provides some direction for forest managers taking on this task themselves, it is primarily intended to help managers communicate better with social scientists to achieve more useful social acceptability assessments.

We have chosen to structure this synthesis around six important considerations for any social acceptability assessment. The first consideration is how to define the fuels treatments being assessed. Fuels treatments might be defined at a broad, abstract policy level or at a narrow, concrete level. The more concrete level of specificity will be of more interest to most forest managers.

How this Synthesis was Carried Out

Development of the literature base for this synthesis of methods relied heavily on electronic library searches. Primary research articles in peer-reviewed journals were specifically targeted, instead of theoretical papers or literature reviews and other secondary accounts, to ensure that high "data quality" standards could be met. Initial search criteria purposely started broad, yielding thousands of "hits." All initially found articles were screened by review of titles, abstracts, and sources, and the pool of primary research articles was reduced to just under 2,000. Electronic searches are often limited to more recent citations (older articles are not in most of the major databases), so the list was expanded by manually adding citations found in newer articles and in reviews of relevant research literature. Citations and reference information for these articles were entered into an EndNote database to facilitate further review and screening. Refinement of this collection and a tightening of the selection criteria reduced this pool to just under 1,000 references. Copies of these articles were acquired (in electronic format wherever possible) and reviewed in more detail. Articles deemed most relevant to the (expanded) synthesis objectives were annotated in EndNote, and the collection of references was reduced to just over 700. Finally, 91 specific articles were selected by the authors to illustrate key issues and major perspectives on social acceptability assessment.

The second consideration relates to how the fuels treatments are represented to people. Verbal descriptions or labels are commonly used when fuels treatments are broadly defined at the policy level. When the fuels treatments being assessed need to be more precisely defined, people may be taken out to sites where similar fuels treatments have occurred to view them first hand, or they may be shown pictures or computer-generated images that represent specific fuels treatments.

The third consideration is whose opinion is being sought. The constituents whose acceptability is deemed relevant can range from local populations who may be directly affected by a given fuels treatment action, to distant national constituencies who also have a stake in how Federal lands are managed.

The fourth consideration for social acceptability assessment is how people will be contacted and a fifth relates to how they will express their judgments. Verbal surveys, by telephone or mail, have been the most popular means of contacting people and gathering information at the broader policy end of the target spectrum, where national constituencies are most relevant. In these contexts, rating scales (e.g. *agree–disagree, unacceptable–acceptable*) and other quantitative responses are often solicited. When the fuels treatments being assessed are more specific in terms of actions and sites and are deemed to affect primarily a local population, small-group interactive methods emphasizing open-ended, qualitative responses have been shown to be an effective way of identifying and describing people's concerns.

Finally, careful thought needs to be given to how the data are analyzed and synthesized and what implications can be drawn. Quantitative data collected through the use of verbal surveys, for example, can be analyzed using powerful statistical tools to identify the most important causes of acceptability differences. The narratives collected from interactive, open-response formats may provide richer, individually articulated expressions of concerns about fuels treatments, but it is much more difficult to ensure the reliability and generalizability of these narratives. In addition, often it is less clear what actions are specifically indicated, and justified, as a management response.

In all studies of social acceptability of fuels treatments, decisions must be made about how alternative treatments are to be represented, who is to be contacted and how, what types of responses are to be captured, and how data are to be analyzed and synthesized.

In all studies of social acceptability of fuels treatments, decisions must be made about how alternative treatments are to be represented, who is to be contacted and how, what types of responses are to be captured, and how data are to be analyzed and synthesized. Every approach has advantages and disadvantages. An important consideration in assessing the social acceptability of fuels treatments is finding the best method for the particular problem at hand. The following pages introduce some of the more commonly used assessment methods and their relative advantages and disadvantages in various contexts. By strategically selecting methods that fit the management contexts, investigators and managers should be able to better understand what fuels treatments policies and actions are most socially acceptable and why. This information should improve the design and communication of fuels management options leading to greater public acceptance and support, and greater success at achieving public safety and ecological protection goals.

Treatment Specificity

One of the first considerations when undertaking a social acceptability assessment is defining the treatments to be considered. Targeted treatments may be defined very narrowly or broadly. Very narrow or specific definitions would be appropriate for assessing several alternative prescriptions for a particular site, where options vary rather subtly in how many trees are to be removed, from what size classes (i.e., "diameter caps"), and where within the site various actions will be taken. Other attributes of the treatments may also need to be specified including how the treatments will be carried out (for example, mechanical thinning versus prescribed fire) and procedural and social context factors (including how management options were developed, how options are selected for implementation, and what persons or agencies develop, select, and implement options). At the broader end of the spectrum, "fuels treatments" may be assessed generally as a public land management policy, similar to policies such as protecting endangered species, providing cheap building materials, or preserving wilderness values.

Photo credit: John Szomoniak

Treatments defined very narrowly are appropriate for assessing prescriptions for a particular site and would include information not only on where the treatment will take place, but also on how the treatment will be carried out.

Approaches

How broadly or narrowly the fuels treatments are specified has important implications for the assessment methods that will be most appropriate and effective. Many studies have been directed at very broad assessments. Often these have included measures of people's rather general environmental values or different perspectives thought to be relevant to the acceptance or support of different forest management policies.

References on Broad Assessments of Social Acceptability

Studies of very broad assessments of acceptability of natural resource policies include Kearney and Bradley 1998, Martin *et al.* 2000, McFarlane and Boxall 2000, 2003; Nordlund and Garvill 2002, Robson *et al.* 2000, Steel 1996, Steel and Weber 2001, Tarrant and Cordell 1997, Wagner *et al.* 1998. In addition, several studies by Cortner and Gardner and associates address fire management policies in particular (Carpenter *et al.* 1986, Cortner *et al.* 1984, Gardner *et al.* 1987, Gardner *et al.* 1985, Taylor *et al.* 1986).

In an example where treatments were broadly defined, a random sample of households in Oregon and the U.S. received a questionnaire asking for their individual "preferences" for forest management policies by rating their "agreement" with value statements, including:

> *Clear-cutting should be banned on federal forest land.*
> *Some wilderness areas should be opened to logging.*
> *The economic vitality of local communities should be given priority when making federal forest decisions.* (Steel *et al.* 1994: 149)

Responses varied by the geographic origin of the respondents (national versus Oregon sample), and by the general biocentric versus anthropocentric value orientation of the respondent.

A study that more narrowly defined the treatment considered was one that looked at support for "prescribed fire" (let burn) policies (Manfredo *et al.* 1990). The telephone survey of national and

Take Home Messages about Broad Assessments

- Defining treatments broadly and representing them to people using relatively simple verbal statements (as illustrated by Steel *et al.* 1994) might best be used to obtain an assessment of "fuels treatments" as a general forest management policy, perhaps as an alternative to more commercially/economically driven policies or ecological/wildlife-based policies.
- For such broad policy (or political) assessment targets, it may or may not be relevant to distinguish between participants (or groups) that will be more directly affected by the policy (such as residents of rural areas near national forests) and the general citizenry.
- If the description/label for the policy does not specify particular locations, or forest conditions before and after treatment (e.g., just "national forests"), there may be considerable ambiguity about the assessment target, requiring individuals or constituent groups to elaborate the assessment target for themselves before responding (Fischoff *et al.* 1999).
- It is not clear whether expressed agreement with (acceptance of) these relatively broad policies will translate to acceptance of the "real world" concrete outcomes and implications of specific implementations of those policies.
- When broad, general descriptions of treatments are used, there is a danger that different constituents will be responding to different assessment targets. For example, communities that reside near particular forest settings with particular management histories are likely to interpret "fuels treatments" quite differently from each other and from a nationally distributed, largely urban population. Differences in acceptability assessments, then, may reflect different values/goals for forest management or different interpretations of what management action/outcome is being offered for evaluation.

Wyoming-Montana residents asked respondents to use a 7-point scale (from *extremely true* to *neither true nor false* to *extremely false*) to indicate whether they would support a prescribed fire policy. The questionnaire also included items to determine attitudes toward prescribed fire (by ratings on *good-bad, beneficial-harmful,* and *wise-foolish scales*) and beliefs about fire effects by agreement-disagreement ratings of items such as:

> *Improves conditions for wildlife.*
> *Allows fires to get out of control.*
> *Causes a threat to human life.* (p. 20).

...support or non-support for prescribed fire was almost equally divided [among study participants].

Knowledge was measured by agree-disagree ratings assigned to statements such as *Most forest fires in the west are started by lightning* (scored as True) and *Forest fires usually result in the death of the majority of animals in an area* (False). This study found support or non-support for prescribed fire was almost equally divided (slightly favoring the support side) in both State and national samples. Those who expressed more positive attitudes toward prescribed fire also showed more accurate knowledge about fire effects (especially in the State samples). Although this study was specific about "prescribed fire" as a forest management policy, it did not specify the particular sites and circumstances in which such a policy might be applied.

Do General Attitudes Predict Specific Behaviors?

Previous research tells us that general attitudes may not predict specific behaviors and, in general, the more closely the attitude object (assessment target) and the stated intentions match the object and actions of concern, the better expressed attitudes will predict actual behavior (Tarrant and Green 1999, Vaske and Donnelly 1999). A key challenge in depicting specific management actions is that as forest management activities become more specific, they become more difficult to represent adequately in words. Precise descriptions of alternative mechanical thinning treatments for a given forest type, for example, would likely require the technical language developed for that purpose by professional foresters. But technical descriptions, while precise, are not usually understood by untrained publics. Further, the technical language used by professional foresters (e.g., "pre-commercial thinning yielding X merchantable cords") could lead to misunderstanding of the treatments in ways that are less than helpful to agency-public relations. On the other hand, simpler verbal labels (e.g., "mechanical treatments") may gloss over some potentially very important aspects of what such treatments might entail in actual practice. In part for these reasons, "perceptual" rather than verbal representations have more often been used when social acceptability assessments are directed to more specific activities.

Still more specific in describing the features of the management alternative is a study using local residents in focus groups to address "strategies that have been suggested as ways to improve forest fire prevention and protection" in jack pine forests near their homes (Winter and Fried 2000: 38). Residents were familiar with the location and forest type, and most or all had firsthand experience of relevant treatments. The focus group process used in the study allowed dialogue among participants. Together these factors all helped ensure that whatever acceptance the participants expressed referred to the same, rather specific management strategies.

An example of a study at the highest end with respect to specifying the outcomes of various forest management treatments is one conducted by Taylor and Daniel (1984). These researchers asked people to assess scenic beauty and recreational quality for a sample of individual southwestern ponderosa pine stands that had been affected by either a severe or low-intensity fire (representing prescribed fire). People looked at slides of these sites taken annually beginning 5 years before the assessment. They were asked to rate these sites compared to a similar site that had not burned in 100 years. Although variations in visible characteristics of sites from year to year were often quite subtle, especially after low-intensity fires, people were able to detect differences and consistently judge both the scenic beauty and recreational quality of the sites using the photo-rating procedure. Acceptability of fire effects depended upon whether fire had been of low or high intensity, how long it had been since the fire, and whether the assessment focused on scenic or recreational values. For more specific treatments, the patterns of acceptability can be more precise and more complex.

Take Home Messages about Assessments of Specific Treatments

At the high end of the target-specificity spectrum (as illustrated in Ribe 2002, Taylor and Daniel 1984), the outcomes from specific fuels treatments applied to the same or similar forest areas (e.g., prescribed fire at different intensities assessed after different recovery periods) and observed directly or represented by photographs leaves much less to the respondents' imaginations.

- The cost of greater specificity is that it may be inappropriate to generalize such specific assessment results to many other sites/conditions, and the implications for national policies are less clear.
- When the acceptability assessment is focused on a very particular forest area "across the fence" from residents of a given community, it may be more appropriate to focus on, and more heavily weight, the responses of local residents and visitors who are most directly affected.
- Even in such particular contexts, however, management on national forests must always be sensitive to national constituencies, through laws and regulations or by some more direct representation in the assessment and decisionmaking process.

Summary

The degree of specificity used in depicting fuels treatments or other management activities has important implications for how the outcome of the assessment can be used. Acceptance of fuels treatments defined at the broad policy end of the spectrum may not provide valid indications of the acceptability of specific actions or outcomes required to implement that policy. At the same time, assessments of particular fuels treatments by particular constituencies in particular forest contexts may or may not be generalized to other locations with different biological and social characteristics. It may be very difficult, and even inappropriate, to use assessments of specific treatments to estimate the social acceptability of policies at the national level. The nature of the treatments or management activities targeted can also have important implications for other aspects of social acceptability assessments. Assessments of broad policies and activities will differ from assessments of more particular, more highly specified targets with respect to how the treatments are represented, who is contacted, and how people are contacted.

Representation of Fuel Treatments

The intent of social acceptability assessments is to determine how (or to what extent) real people will react to actual management actions when they encounter those actions, outcomes, and implications in the real world. Features of the fuels treatments under consideration need to be described to people so that they can accurately express their acceptance or approval of the treatment. Because fuels treatments are complex and their outcomes can vary from place to place over time, adequately representing options for social acceptability assessments can be quite difficult. Common methods for representing options include

- onsite visits or tours
- visual representations
- verbal descriptions

Approaches

Field Trips and Onsite Assessments

One approach to overcoming the difficulty of representing fuels treatments that change over space and time is to visit existing sites representing conditions expected at different stages of the treatment being assessed. However, for a variety of reasons, this is not the easy solution it would appear to be. First, even if it is possible to take people out to sites that properly demonstrate the treatments in question, each site can represent only one point in time, and other important aspects of the fuels treatments cannot be represented by simply visiting example sites. Other considerations likely to be important include how fuels treatments plans are formulated and selected, and by whom; how people currently use or have used the site in the past; and what the implications of the fuels treatments are for local communities or future generations.

Field trips provide an opportunity for viewing sites that represent conditions expected at different stages of the treatment being considered.

Photo credit: Victoria Sturtevant

Second, the typical field trip/tour often differs in important ways from how a person would encounter the treatment site in normal life. For example, real life would rarely offer an opportunity to observe carefully selected and interpreted examples of the changing conditions produced by a fuels treatments program over a long period of time. Third, conditions at the site unrelated to the fuels treatments, such as bad weather and biting insects, may affect how people evaluate the treatments. Despite these limitations, field trips and onsite demonstrations are, and should remain, an important tool in the dialogue between forest managers and the publics they serve.

Photo credit: Nelson *et al.* 2004

Using computer software to modify photographs of existing conditions allows homeowners and landowners to see future impacts of different levels of management

Visual Representations

Visual representations such as color slides and photographs, and more recently, computer imagery have been used extensively in assessments of scenic beauty, landscape preference, and similar surrogates for social acceptability. Conceptually at least, the goal of these representations is to provide a "virtual field trip" to projected future conditions with irrelevant factors controlled. While individual photos/images have often been used, the effects of forest treatments cannot be adequately represented by a single snapshot, whether verbal, photographic, or onsite. Forests and forest treatments are not homogeneous in either space of time. Thus, an adequate representation of fuels treatments must display the variation in forest conditions over the treated area and over time.

One study of the spatial and temporal aspects of ecosystem management (Ribe *et al.* 2002) included photographs of a representative sample of forest views in an intensively managed area of the Cascade Mountains in Washington and Oregon. Forest vistas were selected to represent mature untreated forest, clearcuts, and partial cuts of various sizes, shapes, and stages of regeneration. Forest growth models and GIS mapping techniques were used to simulate the changes that would take place in the structure of the forest in each view over a 20-year period. GIS perspective view techniques ("virtual photographs") and digital photo-editing were used to produce realistic representations of projected future forest conditions for each view under the targeted management regimes.

A sample of residents of the Cascade Mountains study area rated the resulting forest visualizations (scenes) for scenic beauty. A central question addressed in this study was whether ecologically motivated management, as specified in the Northwest Forest Plan (NFP), would produce improved scenic beauty compared to prior management regimes. Results of this study showed scenic beauty to be higher after NFP management methods were applied.

The detailed assessment of the scenic implications of the NFP described above would not have been possible with verbal representations. In addition, the methods used for generating the visual representations

Comparison of Evaluations Gathered Onsite Versus from Photos

Brown *et al.* (1988) studied the effects of forest characteristics on the perceived quality of forest campground settings. In this study, visitors sampled from 11 different forest campgrounds, all in southwest ponderosa pine forests, were interviewed at their campsites. Each respondent was asked to evaluate either the scenic beauty or the overall quality of camping experience afforded by different forest settings represented by sets of color photographs. Ratings, rankings, and expressed willingness-to-pay (as travel costs) for the photographically represented settings were all quite consistent, both within and between the groups. Unknown to the respondents, the photographs of settings included photographs of the campground in which they were interviewed. After ranking photographs, respondents were asked to consider the forest setting for the campground they were currently visiting, and to rate/rank the scenic beauty or provide willingness-to-pay estimates for that setting on the same scale they had just used for the photographic representations. Respondents' on-site evaluations showed good relative correspondence with their photo-based evaluations, but there was a striking difference in the magnitude of the evaluations. Every on-site evaluation was significantly and substantially higher than the photo-based evaluation for the same setting and, with few exceptions, all on-site evaluations were significantly higher than any photo-based evaluation. Clearly "being there" added something that was not captured by the photographic representations. After considering several possible reasons for the differences, Brown *et al.* concluded that the higher (but consistent) evaluations on-site were most likely attributable to the psychological investment (and/or social commitment) induced by the fact that the respondent had personally (and publicly) chosen the site. Such psychosocial factors are likely to be important in many social acceptance situations but may be very difficult to effectively include in either verbal or perceptual representations.

preserved a close and well-specified connection between the features in the visualizations and the biophysical forest conditions they were intended to represent. This correspondence provides two important benefits. First, the validity of assessments is improved—the photographic representations were precise and accurate renditions of the landscape conditions projected to result from the biophysical prescriptions being assessed. Second, assessments based on such representations can readily be translated into specific and precise implications for management prescriptions. (If you are interested in reading about a study that compares results from verbal and visual representations of forest treatments, see appendix B.)

Verbal Representations

Verbal descriptions or labels have been by far the most commonly used ways to represent fuels treatments to people. Verbal descriptions are especially important where the views of national constituencies are of interest. Even when more specific fuels treatments are being assessed at a local level, words may be the only practical way to completely represent fuels treatments options, including how the treatments are to be accomplished and by whom. Appendix C describes results of a telephone survey that used verbal descriptions to convey information about possible forest management policies and actions.

References on Visual Representations

Studies by Buhyoff *et al.* 1986, Gobster and Chenoweth 1989, Hull 1986, Lamb and Purcell 1990, Purcell and Lamb 1998, Ribe *et al.* 2002, Schroeder 1986, Vining *et al.* 1984, Zube and Pitt 1981 all employed methods using visual representations to depict different settings and measure acceptability. This area of research has been reviewed several times (Daniel 2001, Ribe 1989, Zube *et al.* 1982). The effects of both spatial variations (Buhyoff *et al.* 1982, Clay and Daniel 2000, Schroeder and Daniel 1980) and temporal variations (Hull and Buhyoff 1986, Shelby *et al.* 2003, Taylor and Daniel 1984) have been explicitly addressed in studies using visual representations.

The relative ease and low cost of verbal surveys—administered by mail or by telephone—offer substantial practical advantages, accounting for their widespread use in assessing social acceptability. An important assumption underlying the use of responses to verbal descriptions/labels is that responses to those statements actually indicate the level of support for (acceptance of) the policy objectives they are intended to represent. Implementing broad forest management policies necessarily requires specific management actions at particular places and times (e.g., specific fuels management prescriptions applied by mechanical means at particular places and times, with specific outcomes). However, it is uncertain whether expressed intentions of support for statements of broad national policies will translate into support for/acceptance of the specific management actions required to implement them.

Summary

Using field trips or tours to directly expose people to management treatments has both logistic challenges and inherent limitations. However, this method of representation can provide a valuable forum for dialogue between forest managers and the public. Visual representations (photographs or computer images) offer more control over irrelevant factors and can be appropriate and effective for representing specific outcomes of treatments. It is important, however, that any representation adequately captures important social-psychological, perhaps emotional, aspects of the sites/places and treatments being assessed. Rapid advances in technology are making it easier and more feasible for researchers to use the latest environmental simulation and visualization methods to represent management alternatives. Verbal descriptions have been the most frequently used way to represent forest management alternatives, in large part because of their practical advantages over other means. Verbal representations may be quite appropriate in many situations, especially when some broad management policy is being assessed. But actual implementations of fuels treatments policies are always quite specific—vegetation must be cut and removed or burned in one particular way or another close to some real peoples' homes or favorite recreation areas. Verbal labels or even rather lengthy descriptions are not likely to adequately represent these more particular and detailed features of fuels treatment alternatives.

Photo credit: Pamela Jakes

Tours to expose people to fuels treatments provide a valuable forum for dialogue between forest managers and the public.

Advances in Computer Simulation

Computer graphic and environmental simulation technologies have been used to good effect in environmental simulation and visualization (Johnson *et al.* 1994, Orland 1994, Ribe *et al.* 2002, Vining and Orland 1989), and these methods are rapidly advancing in capability and in economic feasibility (Orland *et al.* 2001). New advances in technology are making it easier to create and present realistic perceptual representations of future forest conditions that are precisely and explicitly linked to the biophysical features manipulated by management. Views of familiar sites can be systematically modified to show clearly how some proposed treatment will affect that specific site. Forest change can be captured across a range of scales from broad vista representations (as in Ribe *et al.* 2002, above) to more closed in landscapes. Spatial variability of the landscapes may be represented by "walk-through" or "fly-over" animations in which respondents can be allowed to freely explore the environment they are asked to evaluate. Changes through time can be represented in either vista or near-view situations by time-lapse displays. Interactive computer simulation is beginning to offer real practical possibilities for environmental representation (Bishop and Rohrmann 2003, Bishop *et al.* 2001, Orland *et al.* 2001, Rohrmann and Bishop 2002). Representing the psychological and social dimensions of management alternatives remains a difficult challenge, but some promising directions have already been demonstrated in research like that described above. Not too long in the future (now, for those with the technical competence and adequate budgets), respondents will be able to virtually visit and interactively explore simulations of future conditions in favorite places, accompanied by virtual companions who interact quite naturally with them and the place.

Constituent Identification

No aspect of social acceptability assessments has received more attention than the identification of the people whose views are being sought. Key characteristics of constituents include who they are, where they live, and what their interests are. Examples of constituent types for whom the acceptability of fuels treatments might be of interest include

- nearby residents
- recreation/tourist visitors
- local communities
- special interest groups
- citizens of the State/region/Nation
- future generations
- "stakeholders" – those with a particular stake in the activity or its outcome

Approaches

Whatever segments of the population are of interest, it is critical that steps be taken to get a representative sample of the relevant group or groups. A "representative sample" will cover as much as possible of the range of demographic, cultural, and personal characteristics of the populations of interest. The intent is to ensure that assessment results can be generalized to the population or group of interest and to identify any individual or group factors that may influence the assessment.

Surveyors have been very sensitive to issues about how well participants in surveys represent the population intended for the assessment. Rather elaborate procedures have been developed to ensure random samples and to attain completed participation by those so sampled. These efforts have been mostly successful. Even though refusal rates may exceed 50 percent, the resulting samples usually match the populations of interest on the value and belief dimensions that seem to be the most relevant and important to assessment outcomes.

A "representative sample" will cover as much as possible of the range of demographic, cultural, and personal characteristics of the populations of interest.

Although differing viewpoints can be expected on many issues between males and females, old and young, rich and poor, and more versus less educated people, what is important for social acceptability assessments is how these subsets of the population differ with respect to their evaluations/judgments of forest treatment alternatives. It may be important to know, for example, that rural area residents are generally more (or less) accepting of fuels treatments as a forest management policy than are urban

dwellers. Such a difference might have important implications for information and involvement efforts, for example. Or, if it is found that rural residents have strong preferences for a specific management option that is much less acceptable to urban residents, (or vice versa), managers can use this information to emphasize conflict resolution procedures for example, or go back to the drawing board in search of a compromise plan.

The national survey reported by Shields *et al.* (2002) is a good example of a large-scale assessment involving a diverse national constituency. The report on this survey begins with a detailed breakdown of demographic characteristics for the 7,000+ respondents sampled. A comparison of survey respondent characteristics to census data for the national population confirmed that the sample was basically representative of the national population and therefore the results could be generalized. This test of demographic fit is especially important because the survey was conducted to assess public opinions in the context of formal national policymaking. The report is also typical in that few of the demographic variables had important effects on survey results. Only residential status (east versus west and metropolitan versus non-metropolitan) had important effects on acceptability. For example, the survey showed that "protection of ecosystems and wildlife habitat" was a more important objective to people living in metropolitan areas than to those in nonmetropolitan areas, especially in the West (p. 9).

Photo credit: Victoria Sturtevant

Typically few demographic variables have important effects on social acceptability of management treatments, although it is common to find that people living in metropolitan areas consider protection of ecosystems and wildlife habitat as more important than those living in nonmetropolitan areas.

Although it is common for studies to report acceptability by various demographic variables, other variables may be of greater interest. For example, special interest group membership and differences in relevant environmental knowledge, beliefs, and values have usually been found to have more important effects on results than demographic variables (McFarlane and Boxall 2000, 2003; Robson *et al.* 2000, Steel *et al.* 1994, Steel and Weber 2001). Sometimes it is advisable to purposefully select respondents from existing groups (e.g., Sierra Club members, timber industry employees, professional foresters) to ensure there are enough of these individuals in the sample to investigate the effects of different interests/values on the acceptability of the treatment(s).

McCool *et al.* (1986) sampled 18 different citizens groups in western Montana, ranging from the Montana Loggers Association to the Missoula Sierra Club. Attitudes toward timber harvesting were assessed by responses on a 5-point agree-disagree scale to statements such as:

> *Scenery should not be a consideration in designing timber sales.*
> *Areas that have been logged will eventually return to their original condition.*
> *Thinning a forest will usually increase its scenic beauty. (p. 389)*

Scores on this attitude scale clearly distinguished one group from another. The logger association group showed the most favorable attitudes toward timber harvesting and the least concern for scenery, and the Sierra Club group showed the least favorable attitudes toward logging. In the same study, individuals in all 18 groups were shown the same set of 125 color slides sampled from Montana forests exhibiting a range of forest management conditions, from pristine forests to areas recently modified by timber harvests. Ratings of scenic beauty were consistently higher for the least disturbed sites (preservation) than for the most disturbed sites (maximum modification) over all of the groups. The ratings differed among the groups—those expressing more favorable attitudes toward timber harvesting tended to rate all harvest-impacted scenes higher than did those with less favorable attitudes toward timber harvesting (p. 390). However, even these different interest groups, with different expressed attitudes toward harvesting and scenic beauty, agreed quite closely on the relative scenic beauty of the scenes presented. In this case, special interest groups differed much more in their verbal assessments of the social acceptability of general forest management policies than in their perceptions and evaluations of the concrete outcomes of those policies. (To read more about other studies that report on how different attributes such as values, attitudes, and knowledge are related to perceptions of forest management, see appendix D)

However, even these different interest groups, with different expressed attitudes toward harvesting and scenic beauty, agreed quite closely on the relative scenic beauty of the scenes presented.

Summary

In assessing acceptability of fuels treatments, sampling of respondents for the assessment is important to accurately represent the population of interest. In assessments serving as opinion polls to inform formal management decisions and policymaking, a random sampling of the population of interest, with attention to adequate representation of the sociodemographic profile, can be important. But in

studies focused on learning about environmental and social factors that may have important effects on public responses to forest management options, alternative methods of selecting people to survey may be more appropriate. In these contexts random sampling may be replaced by other methods to ensure that respondents represent the range of variables/characteristics likely to have potent effects on acceptability judgments. Studies that have directly investigated how personal and group variables interact with environmental features to affect acceptance judgments have shown sociodemographic variables to be much less potent in this regard than relevant environmental values, knowledge, and beliefs.

Contact Constituents to Gather Information

Once constituents of interest have been identified, they need to be contacted. Contact can occur directly by group or individual face-to-face interviews or more indirectly by telephone or mail-back surveys. Using focus groups and other small group formats to gather information from people provides opportunities to supply more information on environmental and social contexts and enables higher levels of interaction among participants. In some studies researchers may have no direct contact with constituents at all. For example, researchers may collect relevant data by reviewing property or purchase records (Kim and Johnson 2002) or by reviewing the contents of newspapers and other media to determine the acceptability of different actions (Bengston . 1999, Bengston *et al.* 2001, Bengston and Fan 1999, Zhi and Bengston 1997). Expanding computer networks and the Internet are increasingly opening new forums for gathering input from constituents (Kangas and Store 2003, Wherrett 2001).

Photo credit: Ryan Gordon

The NEPA requirements for public involvement could be one approach to making contact with constituents for social acceptability assessments.

Important questions to consider when deciding how to contact constituents include

- Who is doing the asking?
- Who else is watching/listening?
- Who are the other participants?
- What will be done with the responses?

Approaches

The public involvement process traditionally followed to comply with NEPA (National Environmental Policy Act) regulations could be considered one means of making contact with constituents for social acceptability assessments. In this process, alternative plans/policies are presented to the public to obtain some indication of its response (acceptance). However, both the involved publics and expert

Opinions on the Public Involvement Process

A 1998 national telephone survey of 904 people included an assessment of public support for different levels of public participation in ecosystem management decisions (Steel and Weber 2001). The majority of respondents favored higher levels of public input: 35 percent favored having the public *Serve on advisory boards to review and comment on decisions*, and 36 percent favored having the public *Act as a full and equal partner in making management decisions*. Only 14 percent of those surveyed thought the public role should be to Provide suggestions and let resource professionals and managers decide. (This option most closely resembles the traditional NEPA-based process.) At the other extreme, only 12 percent favored *The public should decide management issues and resource professionals and managers should carry them out* (p. 128). Thus, the public seems to desire a stronger, but balanced role, along with experts in the making of forest (ecosystem) management decisions.

evaluations indicate that this process of informing the public of management options (developed by professional staffs), allowing public review of the options (as by reading the published Environmental Impact Statement), and then recording positive and negative comments (in public meetings, letters, or other correspondence) has been far from ideal (Gericke *et al.* 1992, Germain *et al.* 2001, Shindler and Neburka 1997, Steelman and Ascher 1997, Tuler and Webler 1999).

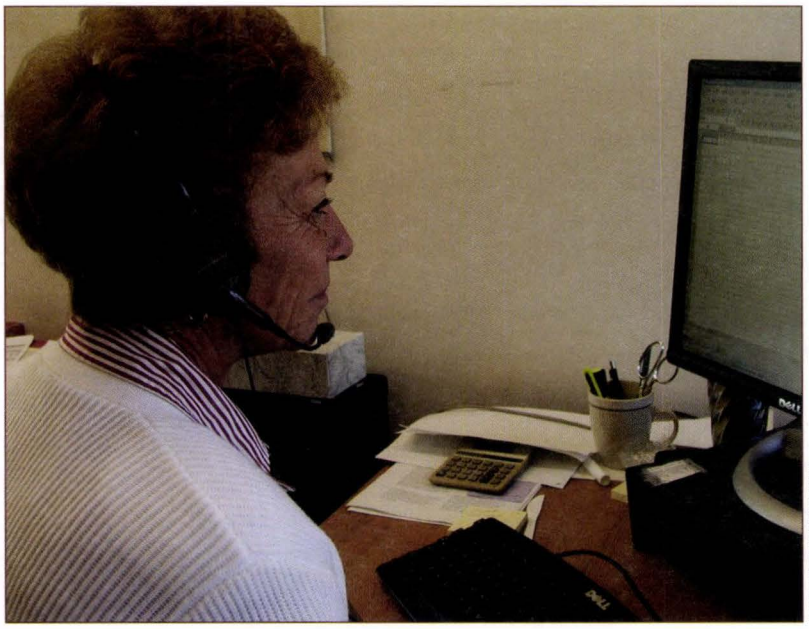

Photo credit: Pamela Jakes

The relatively low cost of telephone surveys helps explain their widespread use in assessing social acceptability.

A common concern with traditional public meeting and comment-based procedures is whether those who actively participate in this process represent public values and wishes, or represent only certain more highly motivated and organized "special interests" (Gericke *et al.* 1992, Steelman 2001). Complaints range between those who feel that commercial interests (timber companies, livestock grazers, etc.) are overrepresented and those who feel that environmental interests (especially those from "out of town") are overrepresented.

One obvious alternative to public meetings to learn public views on forest management alternatives is a systematic survey or opinion poll. The contact method chosen most often for these types of surveys is by mail or by telephone. Telephone and mail survey methods are some of the least expensive

How Similar are NEPA Participants and the General Public?

One case study (Overdevest 2000) researchers wanted to determine if participants in a NEPA process were substantively different from local members of the public who had not officially been involved in the process. The study was conducted in the context of a national forest ecosystem management demonstration project in which management options included regeneration harvests implemented by commercial timber sales, prescribed burning to mimic natural ecosystem processes, and addition of large woody debris to streams to improve riparian habitat. Public involvement followed the familiar NEPA "consultative model" (Germain et al. 2001) of inform, review, and comment. The key question addressed was whether the original participants in the NEPA process were representative of the more general (local) public with regard to (1) sociodemographics, (2) interests (values) regarding public land management, and (3) preferences for particular forest management options. Researchers used responses from a telephone survey of 498 randomly sampled members of the general public and 31 of the 37 participants in the original public involvement process to answer this question.

What researchers found with respect to sociodemographics was that (NEPA) participants "tended to have more general education, more formal education about forests, greater incomes, a greater percentage of them owned land adjacent to National Forests, and a greater percentage of them held occupations related to natural resources compared to the public" (p. 690). That is, the original participants were not a good match to public sociodemographics in the area. Regarding interest group representation, the original participant group had more environmental preservation interests, State agency interests, and timber interests, and they had fewer hiking/other recreation and fewer Forest Service agency interests than the public sample (p. 691). At the same time, however, the original participants agreed with the public that forest managers should give *more* emphasis to ecosystem protection (wilderness, water quality, endangered species, old growth, cultural and heritage sites) and *less* emphasis to commercial uses (road building, clearcutting, mining, application of fertilizers/herbicides/pesticides). NEPA participants expressed support for more "commercial timber growth," while the public sample desired the *same* as current levels. Participants wanted the *same* level of tourism promotion, but the public wanted less. Based on this study, some of the concern about how poorly traditional involvement procedures represent the public may not be merited. On the most important and relevant management-policy dimensions, participants and members of the local public did seem to fit quite well. Still, it is clear that other public involvement/contact methods are desired by the public and by managers. What is not so clear is just what those other methods should be--options range from systematic representative surveys of national (or other relevant) populations to intensely local, interactive, community-based planning approaches.

Steps in the Survey Process

Typically the first step in the survey process is to identify a population of interest (e.g., national, regional, or local) and then sample address or telephone number lists to identify potential participants. The initially identified pool of potential participants is contacted by phone or mail (or both). Telephone surveys may use random number dialing systems in which the last four digits of telephone numbers are replaced by random numbers to gain access to those with unlisted numbers. This does result in surveyors making calls to FAX machines, businesses, and non-existent phone numbers, but the costs are relatively low. The parallel concern for mail surveys is the need for up-to-date mailing lists. Both methods must contend with relatively high refusal rates.

In mail (or mail-back) surveys, the Dillman method (2000) is typically used to encourage participation through a progressive series of urgings/reminders (initial mailing of survey, postcard reminder, repeat mailing of survey, etc.), continuing until the sampled individual agrees to participate, or the assessor runs out of time and money to persist. This has usually resulted in approximately 60 percent response rates, but lower rates are frequently experienced. There are several variations on this basic procedure. For example, an individual may be contacted initially by a researcher at a campground or a wilderness entry point. Here the researcher asks the person if he/she would be willing to participate. If the answer is yes, the initial contact is followed by a telephone call and/or a mailed survey. However, the danger is that the more pressure used to recruit participants initially, the greater the chance those who do not respond may be different in important ways from those who do. Where this is an important concern, followup contacts (or sometimes pre-survey contacts) with nonrespondents (in telephone or direct interviews) are used to confirm that they do not differ from respondents in important ways.

ways of gathering information from large numbers of constituents. However, crafting a valid and effective survey and designing the respondent sampling procedures require great expertise and care. Once created, however, the survey can be administered efficiently by people with relatively little training. Telephone surveys especially can be administered inexpensively, with rather complicated variations in composition and sequencing of items/questions controlled (or cued) by a computer. However, telephone surveys are limited by the types and numbers of questions that can be presented and the types of responses that can be solicited in a telephone call. Mail surveys offer greater flexibility in content, including the opportunity to use graphic presentation formats and a somewhat wider set of response options.

Both telephone and mail surveys limit the opportunity for a researcher to describe the management issue in detail and for constituents to elaborate on their responses. In part because of these limitations, a number of investigators/assessors have turned to small group interaction formats, especially one form or another of focus groups (Brandenburg and Carroll 1995, Winter and Fried 2000). While long used as a means for designing and pre-testing more controlled surveys, these small group formats have

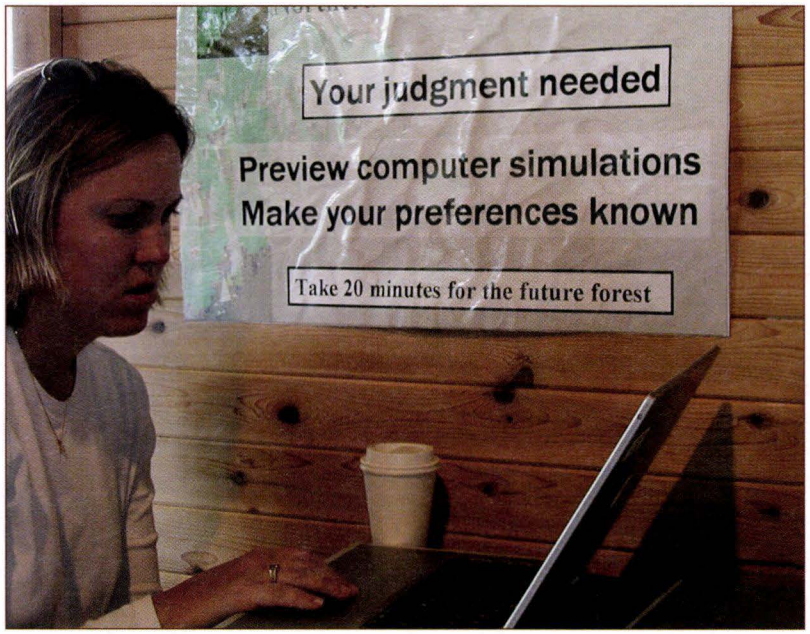

Photo credit: Pamela Jakes

New computer simulation technologies improve the presentation of more complex scenarios and facilitate the recruitment of study participants in locations convenient to them.

increasingly come to be used as stand-alone assessment tools. Focus groups and similar approaches allow direct and much more intensive interaction with participants than mail or telephone surveys. These small group processes allow greater opportunity for unanticipated issues and perspectives to emerge and to be framed in ways that are more natural to the participants. But small group processes generally result in a much more limited sampling of constituent populations and rarely are the samples random. People geographically near to where the target policy or treatment is to be implemented are much more likely (by explicit design or as a practical constraint) to be included in small group assessments. Concern about representation of broader national constituencies is very appropriate for decisions about national forests and parks. However, there is evidence that small group methods, with appropriate sampling schemes, can capture the range of constituent features that have consistently proven the most important determiners of acceptability.

Winter *et al.* (2002) provide a good example of the focus group approach applied to wildland fuels management issues. In their study, focus group discussions were conducted in four different wildland/urban interface communities exposed to fire threat. Typical of focus group studies, the rather sparse quantitative results (tallies in remark categories) are illuminated by selected quotations of representative or illustrative participant remarks. For example, the following remark was coded as "acceptance":

> *I support both (mechanical treatment and prescribed fire) if it's done under the right conditions—if they get somebody that has some experience and not some greenhorn out there that starts to burn up the whole state.*

To illustrate the "escaped fire" category, the authors offer:

> *They make all sorts of promises, and then they can't control it.*

An example, under the category of "air quality and smoke":

> *When you have a lot of burns, you're going to have a lot of air quality problems.*

Details about the Focus Group Study on Fuels Management Issues

Winter *et al.* (2002) conducted focus groups in 4 communities to determine resident perceptions of wildland fire management. They used mail and telephone contacts to recruit participants, and convened focus groups of 4 to 10 participants in a central location. Facilitated group discussions lasted 90 minutes and all comments were tape recorded for later analysis. The "... standard interview protocol consisted of six open-ended questions" that "encouraged participants to discuss their beliefs about fuels treatment approaches" (p. 17). The 78 participants (three groups in each community) produced 1,745 individual "remarks," which were coded as reflecting "acceptance" and "factors affecting acceptance." Remarks were also categorized under the broad headings of acceptance (319 total remarks), outcome beliefs (221), personal importance (16), situational specifics (22), and agency trust (67). The number of remarks in each of these categories were counted and compared across the four communities. For example, groups in all four communities produced outcome belief remarks that referred to "escaped fire," and a total of eight such remarks were recorded across all 12 groups.

The authors acknowledge that the focus group method provides little basis for generalizations to the four communities because of the small samples. "Nor can we relate people's views to their specific situations, demographic characteristics, and experiences" (p. 21). That is, what is known is what participants said in the focus group session. Focus groups do provide much greater opportunity for participants to offer unexpected observations and perspectives, and the typical report format (quoted remarks) provides a much richer impression of the participants' "behavior" than do tables of means and standard deviations. But, as the authors acknowledge, the procedure provides little basis for weighting the comments/perspectives uncovered. In other words, there is little indication of how important one concern might be relative to others.

In all, 34 remarks are quoted in the report (of the 1,745 remarks recorded). Among the conclusions offered by the authors based on this analysis is "Support for fuels management appears to be related to perceived outcomes. Fuel management strategies are 'bad' if they lead to escaped and catastrophic fires, are not cost-effective, result in long-duration smoke events, or reduce the aesthetic quality of surrounding landscapes" (p. 20). This conclusion is consistent with the results of a number of survey studies and fit well with the authors' expectations.

Summary

For a long time, verbal surveys by telephone or mail have been the most popular approach for contacting people and asking them questions about various issues. This is especially true when broad national or regional constituencies are deemed relevant, and the costs of direct contact would be very high. Although mail and telephone contact methods are effective in attaining large and representative samples of constituents, they are generally quite limited in their ability to represent management

activities, especially the kinds of detailed differences in means and ends that might be important for alternative fuels treatments. New computer simulation and visualization technologies, including facsimiles of "virtual reality," and the exponential growth of the World Wide Web can help with these problems by allowing efficient presentations of more complex scenarios to large numbers of constituents.

Small group contact approaches have typically emphasized qualitative rather than quantitative data, conversations rather than counts. Thus, it is difficult to determine the relative importance of one issue/concern versus another (i.e., the social acceptability of the target, for example), for either the constituent population or for the sampled group participants themselves. In addition, those facilitating the groups must work to prevent domination by one person or perspective and avoid "group think" dynamics, while also maintaining an appropriate balance between facilitating and directing the group discussion. Translating the results of small group assessments into management implications is often not straightforward. Still it is instructive for managers to know about the nuances of the special and intense feelings and concerns that one or more individuals have for a given forest area or for some existing or idealized forest features. Another concern, which also applies to more structured telephone and mail surveys, is the underlying assumption that people are able to recognize and talk about their beliefs and deeply held environmental values and that they know and can articulate the motives for their actions.

Comparison of Three Methods of Contact—Mail Surveys, Focus Groups, and Community Dinners

Three approaches to assessing people's views—a mail survey, focus groups, and community dinners—were directly compared in one study (Carr and Halvorsen 2001). In the mail survey, 612 participants (41 percent return rate) were presented with the usual battery of items assessing sociodemographics, beliefs and values, and attitudes toward forest management policies. Relevant questions about specific forest management options included whether respondents desired *more, less, or same emphasis on creating campgrounds, clearcutting for aspen and jack pine re-growth, and allowing old-growth forest to develop.* In addition, beliefs about forest management were also assessed (e.g., *How forests are managed is the responsibility of professional foresters*).

The 105 participants in the focus groups were solicited from 10 civic, recreational, special interests, and other existing groups in the three communities studied. Open-ended questions that guided the discussions included

> *How do you use and enjoy the Ottawa National Forest?*
> *How do you want to see the Ottawa National Forest managed?*

Newspaper ads invited participation in low cost (but not free) dinners, resulting in 31 participants in one community and 12 in another. After dinner, the same general questions as in the focus groups were posed to guide discussion at each table. This was followed by reports to and discussion with the whole group. Remarks were recorded and later analyzed by the investigators, and selections are quoted in the report, following usual focus group practices.

Participants in all three methods were quite similar to each other in demographics, but all differed from the census data for the communities. Compared to the population at large, participants were older, had higher incomes, and more education. In addition, the proportion of females was less in the participant group than in the population at large. Thus, none of the methods were successful in representing community/population demographics.

Results of the focus groups and dinners were very similar to each other, and the authors concluded "... analysis of the transcripts indicates that the community dinners and focus groups provided broader, more generic information about the connection between communities and public forests" (p. 118). Group results did parallel the survey in most regards, but "spiritual value" (included as an item in the survey) was not well represented in the groups, and local control, multiple-use management, and access were featured in the groups but were not well represented in the survey. Responding to the concern that planning based on local community group participation might inadequately represent national constituencies, the authors offer "... results from this study show that at least some community residents are neither parochial nor simplistic in their thinking about these forests. Participants in the study represent the full range of value orientations found nationally from 'preservation' to 'utilization'" (p. 123).

Response Options

Social acceptability assessments in their many forms offer a variety of formats for participants to express their judgments. Verbal surveys have typically used scaled response formats, especially *agree-disagree* scales of 5 or 7 ordered categories. Perceptual assessments, such as those where people respond to color photos or images, have also used rating scales, usually with 5 to 10 ordered categories. In the relatively few studies where people have been explicitly asked about "acceptability," response scales typically extend from extremely unacceptable to extremely acceptable in 5, 7, or 10 categories. Other closed response formats include ranks (order the options from least to most acceptable) and forced choices (indicate which of two or more options is more acceptable).

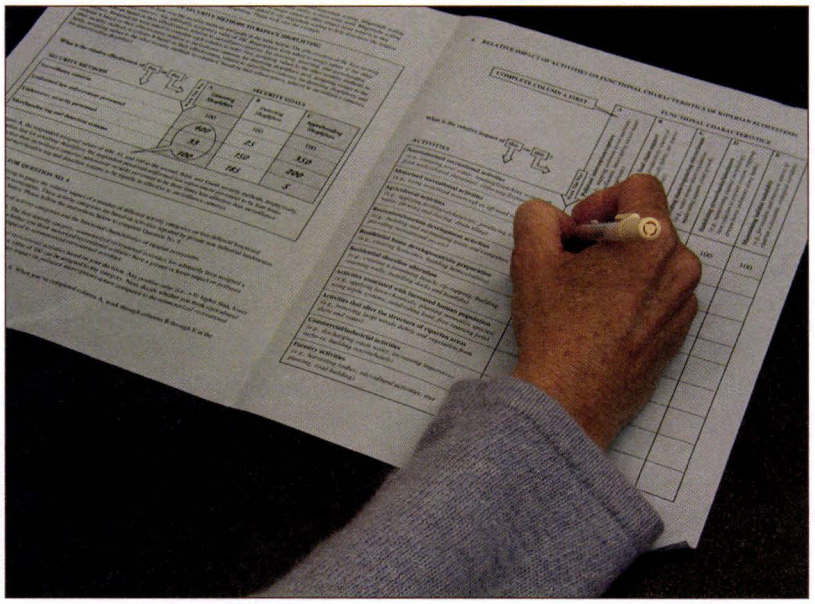

Photo credit: Pamela Jakes

Verbal surveys, by phone or mail, are generally characterized by having a large number of individual statements that respondents rate using one or several scales.

Individual interviews or small group discussions more frequently allow open responses. Whether the respondent's remarks indicate "acceptability" or "unacceptability" is usually inferred by the investigator, using more or less formal content analysis methods. Similarly, the "strength" of the individual response is gauged by investigator analysis/interpretation of remarks. On a group basis, responses may be tallied to achieve some aggregate indication of the degree of acceptance non-acceptance. This tallying could include summing the number (or percent) of participants making positive versus negative remarks or the total number (or proportion) of remarks in each category. Unlike rating scales and other closed-response formats, open formats are less likely to be subjected to quantitative measurement or statistical analysis methods. Thus the characterization of what responses were made in a given assessment and the implications/conclusions that are merited are both left much more to the judgment and interpretation of the investigator.

Approaches

The focus in this section will be on a consideration of two general closed-format options: the typical multi-item verbal survey and the conjoint or stated-choice response formats. Verbal surveys, by phone or mail, are generally characterized by having a relatively large number of individual statements (items) targeting individual forest management options (or aspects of options) often accompanied by an array of constituent values, beliefs, attitudes, and intentions thought to be relevant to the assessment.

More about Scales

Often investigators have favored scales with an odd number of categories, extending from negative to positive numbers, with the middle of the scale designated as "0" and anchored verbally as either "neutral," "don't know," or "neither acceptable nor unacceptable." Commonly responses on the negative side of the scale are classed together as indicating "unacceptable" targets and the positive side is taken as indicating "acceptable" targets. Even-numbered scales do not offer the middle/neutral option, forcing respondents to select the "unacceptable" or the "acceptable" side of the scale, however slight the difference. It is more common in these cases to interpret the scale as extending continuously from the very least acceptable condition (most unacceptable) to the very most acceptable—that is, acceptability is treated as a relative scale with no special meaning ascribed to the midpoint of the scale.

Respondents typically rate tens of these "items" on one or several scales to indicate degrees of agreement, acceptance, satisfaction, belief, importance, and so on. Statistical analyses, especially multivariate techniques, are used to determine how these many individual items are intercorrelated, to construct coherent factors such as biocentric versus anthropocentric value systems, and to determine how these factors may in turn relate to support for preservation-oriented versus utilization-oriented management policies.

An important feature of the multi-item format is that each participant responds to each statement/item separately, so it is possible for respondents to rate a number of inherently conflicting items as all being of high (or low) importance (agreement, acceptance, etc.). That is, this format can allow the respondent to have his/her cake and eat it too.

An important variation on the closed-response format is to present more holistic representations of policy options that vary in multiple dimensions at once and force respondents to choose between them. In the stated-choice format, choices (or sometimes ratings) of such holistic (or conjoint) options are analyzed to determine how various factors were "traded off" against each other to determine which alternatives were preferred (Adamowicz *et al.* 1997, Dennis 2000).

Kneeshaw *et al.* (2004) present an example of a conjoint method for assessing the acceptability of alternative wildfire management policies. Rather than asking respondents to rate individual aspects of fire management options one at a time, they presented hypothetical fire management scenarios that forced respondents to consider multiple attributes at a time. For example, one scenario was a *lightning-caused fire with no effect on air quality, low risk to private property, allowing outdoor recreation facilities to remain open, and from which the forest will quickly recover.* A contrasting scenario was *a*

human-caused fire producing poor air quality, exposing private property to high risk and closing recreation facilities and requiring many years for the forest to recover. A total of eight such scenarios were required to fulfill an orthogonal fractional factorial (main effects) design with two level of each of the five situational dimensions.

Respondents rated the acceptability of three different fire management policies: "1) immediately put the fire out; 2) let the fire burn but contain it so it does not get out of control; and 3) let the fire burn out on its own without trying to contain it" (p. 482) for each of the eight wildfire scenarios. The rating scale ranged from -3 (highly unacceptable) to 0 (no opinion) to +3 (highly acceptable).

... "containing the fire" was the most acceptable management option... and "let the fire burn" was the least acceptable option.

The conjoint statistical analysis revealed the relative acceptability of each management policy for each scenario; "containing the fire" was the most acceptable management option over all scenarios and "let the fire burn" was the least acceptable option. More importantly, the conjoint analysis provided estimates of the relative importance of each of the five dimensions represented by the eight scenarios. Based on that analysis, the authors concluded:

> Although the variation in the relative importance of the five factors was minor, it is worthwhile to note that fire origin was one of the most important factors for "put the fire out" and one of the least important factors for "let the fire burn". In addition, the relative importance of risk of private property damage and forest recovery was consistently high in influencing acceptability of all three management actions, and the relative importance of outdoor recreation was lowest in the three models. Although area closures due to a fire can be an inconvenience, perceived opportunities to recreate in other nearby areas may serve as an acceptable substitute. (p. 486)

Thus, even though respondents never directly rated the importance of fire origin, risk to private property, or any of the other three dimensions, their ratings of the eight conjoint scenarios allowed the investigators to derive importance weights for all five dimensions. Because wildfire management decisions are always made in complex multidimensional situations, assessments based on responses to global (conjoint) scenarios, like those assessed in this study, may provide more valid indications of social acceptability than would some aggregation of responses to each dimension one at a time in a multi-item format.

Summary

The choice of open-ended versus closed-ended response formats is perhaps the most basic expression issue faced in social acceptability assessments. Open formats offer greater flexibility for the respondent and allow multiple perspectives and nuances to emerge. However, analysis of open responses creates challenges for those who desire quantitative measures that can be subjected to reliability and other statistical analyses. Formal content analysis methods provide some systematization and some degree of repeatability, and computer text analysis systems are becoming more sophisticated and more useful and could offer increased objectivity and standardization in this context. Those who prefer the most qualitative methods emphasize interpretation over analysis and are generally less concerned about repeatability or reliability. The challenge for these investigators is to translate personal, phenomenological, and emotional narratives into useful and justifiable implications for public land managers.

Open formats offer greater flexibility for the respondent and allow multiple perspectives and nuances to emerge.

Closed-response formats are typified by the array of rating scales that have been used in telephone and mail-back surveys. The obvious advantages are that respondents can more quickly address a wider array of issues/questions and express themselves in ways that are readily quantified and analyzed with appropriate statistical procedures. Specific issues with direct policy/management relevance can be included, so responses can more readily be translated into management implications. Of course, there is always the danger that the researcher will have gotten the issues wrong, asking the wrong questions and/or not asking important right questions. Also, verbal survey items tend to demand "reasonable" answers, even if respondents do not hold reasonable or considered opinions about the issues queried (Fischhoff 1991). This may be useful for learning about the relative acceptability of selected targets, but it may not address whether any of the options are of any consequence to the respondents or are even appropriate to consider in the context.

Closed-response formats allow respondents to more quickly address a wider array of issues/questions and express themselves in ways that are readily quantified and analyzed with appropriate statistical procedures.

It has been suggested that conjoint methods, like that used by Kneeshaw *et al.* (2004), bring people into contact with assessment targets in more realistic ways, where tradeoffs among many multiple,

conflicting attributes must be confronted (e.g., Louvier and Timmermans 1990). While alternative scenarios can be quite complex, the response required of the participant is relatively simple and straightforward—choose the most acceptable (or rate each) alternative. This simplicity in responses is somewhat countered by the demand for greater sophistication in the design of alternatives, presentation formats, and data analysis procedures. As with any closed-response system, the respondent is restricted to the options offered and the responses allowed. As with multiple-item surveys, the assessor can get this wrong and/or miss important attributes or misrepresent the relationships between attributes. Still, requiring respondents to make tradeoffs among multiple and often conflicting attributes can be more representative of a real world choice. The importance weights derived for the included dimensions take these tradeoffs explicitly into account and are likely to be better estimates of what factors influence treatment acceptability. In addition, the conjoint choice-based approach provides the important ability to postulate and test hypothetical policy scenarios, giving managers a powerful way to design and experiment with alternative policies and to predict their likely acceptability to constituents.

Analysis and Synthesis

Those conducting social acceptability assessments must decide how they will analyze and synthesize the information they gather from people. This includes decisions about how responses are categorized, whether or not responses are quantified, and how or if responses are aggregated, compared, or otherwise combined to achieve a measure of the acceptability of the treatments/alternatives being evaluated. Among the mechanisms of analysis and synthesis are

- counts
- votes
- interval or ratio scale indexes
- documented consensus
- selected representative narratives
- statistical constructs

The analysis and interpretation of data is perhaps the most technical and specialized component of social acceptability assessments. This is not something that should be attempted without appropriate training and experience, i.e., "don't try this at home." The treatment of this topic here will be quite general and is not intended as instruction in the various analytic methods that have been applied.

In earlier sections, we discussed various approaches to representing the treatment, contacting constituents, and gathering responses from people. Each of the approaches has its own favored set of analytic methods. For example, most closed-response approaches use quantitative scales (e.g., 1 *very unacceptable* to 5 *very acceptable*) to gather responses. This allows rather direct calculation of the strength of relationships among variables (statistical correlation), grouping of people with similar response patterns (factoring/clustering), and/or testing of hypotheses about the acceptability of different policies. These methods help to separate random features of the data from those that represent systematic (nonrandom/nonchance) associations and differences. Additional analysis can further distinguish which of the statistically significant variables are also making some substantive contribution to the effects observed, i.e., which have scientific or managerial significance.

The analysis and interpretation of data is perhaps the most technical and specialized component of social acceptability assessments.

Perhaps the highest goal for analyses of social acceptability assessment data is to determine cause-effect relationships. In other words, what factors of the management action or treatment cause social acceptability to be higher or lower? The most convincing demonstration of cause-effect relationships remains the controlled experiment—where random subsets of sampled respondents are presented with systematically

varied forest management alternatives in experimentally controlled contexts. Differences in responses (social acceptability judgments) can safely be attributed to the specifically manipulated features of the treatment options presented. This model underlies the analysis of multiple-item verbal surveys, where the specific items have been manipulated/selected by the assessor for presentation (usually to all respondents, in a within-subject design). Similarly, the stated (conjoint) choice experiment presents carefully designed options (scenarios), the differing features of which are assumed to determine respondent choices.

Approaches

About Statistical Significance

While attention in many social acceptability assessments has been focused on "statistically significant" results, this should not be viewed as the endpoint of analysis. Especially in large-sample, multiple-item surveys, it is quite common for differences in means and correlations to be highly "significant" in a statistical sense (e.g., $p < .0001$). The appropriate interpretation of such significance is that the differences/relationships observed are "reliable": outcomes are very unlikely to be based on random events, and the same or very similar outcomes would be expected on a repeat application of the same questionnaire to a new (same-size) random sample of respondents. Such statistical significance may be taken as a prerequisite for paying attention to a factor/variable/attribute at all. The next question that should be asked, however, is how important is this factor?

...it is quite common for differences in factor means and correlations to be highly "significant" in a statistical sense... The next question that should be asked, however, is how important is this factor?

As discussed earlier in this paper, some sociodemographic variables are consistently found to be significantly related to acceptability judgments. But further analysis (commonly reported in more recent survey reports) reveals that these tend to be very weak or negligible effects on social acceptability ratings. That is, they account for (explain) a small share of the variation in social acceptability (often as little as 1 percent for a single "significant" variable and rarely more than 10 percent for the aggregate of all significant sociodemographic variables). In contrast, value and belief variables (often measured within social acceptability assessment surveys) are consistently statistically significant and they also account for more substantial shares of the acceptability variance (often near 50 percent), so their effects are large enough to be taken seriously by investigators and by managers (McFarlane and Boxall 2000, 2003; Steel and Weber 2001, Tarrant and Cordell 1997).

Testing Conceptual Models

In more sophisticated verbal survey studies, the analysis is sometimes taken further in an attempt to determine in more detail how the patterns of significant and substantial variables work together to affect acceptability judgments. Methods such as structural equation modeling, hierarchical regression, and factor analysis may be used. Proper use of these methods requires the development of explicit and rather precise theoretical/conceptual models. For example, it has been shown that basic *values* combine with relevant *knowledge* to affect specific *attitudes* that in turn affect *behaviors/intentions* toward alternative management policies (McFarlane and Boxall 2000, 2003; Tarrant and Cordell 1997). Such explicit models can be directly tested by statistical evaluation of the patterns of associations they imply should be in the data.

Analyzing Conjoint Assessments

Conjoint methods (e.g., Kneeshaw *et al.* 2004) also have the goal of determining cause-effect relationships, but approach it somewhat differently. Rather than presenting a large number of individual items and then using correlation-regression analyses to sort out the interrelationships among them, the conjoint approach presents a smaller number of complex alternatives (scenarios) that combine

Testing a Conceptual Model

In a study conducted by Vaske and Donnelly (1999), a mail survey was administered to a random sample of 960 respondents (53 percent of initial sample) from the Front Range in Colorado. Questions in the survey assessed *value orientation* (multiple items intended to capture biocentric versus utilitarian values), *attitudes* toward wildland preservation (multiple items), and *behavioral intentions* (expressed intention to vote for preservation policies). When factor analyzed, the value items factored into biocentric and anthropocentric dimensions as predicted and were significantly correlated with both preservation attitudes and voting intentions. Similarly, preservation attitudes correlated with voting intentions. "The positive coefficient (value orientation to preservation attitude) implies that individuals with a biocentric value orientation were more likely to hold a pro-wildland preservation attitude. Finally, consistent with Hypothesis 4, as the pro-wildland attitude increased, pro-wildland preservation voting intentions increased..." (Vaske and Donnelly 1999: 533). A more detailed analysis, however, showed that value orientation did not have a direct effect on voting intentions, independent of the effect of preservation attitudes. That is, the value effect was mediated by the attitude toward preservation of wildlands, as shown by the final path analysis,

value => preservation attitude => voting intention.

This mediation model was found to have the best fit to the data by a number of statistical criteria. The conclusion, which would not be clear from a less detailed analysis, was that value orientations affect behavioral intentions only indirectly through their effect on attitudes more specific to the behaviors (intentions) being assessed.

Photo credit: Pamela Jakes

Models have shown that basic values combine with relevant knowledge to influence behaviors toward alternative management policies, such as motivating private landowners to take responsibility for fuels treatments on their property.

("conjoin") a number of features or dimensions of the treatment or management alternatives being assessed. Participants express their preferences (choices or ratings) among these alternatives, and the pattern of their choices is analyzed to determine the relative contributions of each of the factors/dimensions represented. The information gathered from conjoint studies is then analyzed using regression models (logit or ordinary least squares). In this way, the researcher can determine what factors had the most influence on acceptability judgments.

Analyzing Open-ended Responses

The analysis of open-ended responses does not appear to be as complex quantitatively, perhaps involving only tallies of the number of specific types of topics/remarks observed. This apparent simplicity in numbers should not mask the complexity of making sense out of hours of conversations among dozens of different respondents, producing hundreds of individual remarks/comments. The typically sparse (or non-existent) quantitative analysis of open-ended responses is frequently buttressed by extensive quotation and interpretation of illustrative/typical remarks made by respondents (Brandenburg and Carroll 1995, Winter and Fried 2000, Winter *et al.* 2002).

Summary

The multi-item verbal survey (by phone or mail) is the most commonly used method of assessing social-acceptability. A well-developed set of multivariate statistical techniques is available for analyzing such data, including methods for determining the individual and combined strength of different variables on acceptability. Further, structural equation models (and related analyses) can more fully explain relationships among variables elucidating the underlying causes of social acceptability judgments.

The conjoint approach is less commonly used in social acceptability assessments, and the analysis methods for the data produced are less well known among investigators. The final models (regression equations) that result are very similar conceptually to the models produced from multi-item surveys. However, the alternatives developed in the conjoint approach are defined by independent variables (dimensions) that are explicitly selected and combined by the investigator, following a specified

experimental design. Perhaps the most important advantage of this approach is that the respondents are presented simultaneously with all of the variables conjoined in the alternatives (scenarios), so that their choices reflect tradeoffs among potentially conflicting variables. The importance of each variable/dimension is determined by analysis of the responses to the holistic (conjoint) scenarios.

In analysis of open-ended responses, the biggest challenge is to find some means to ensure reliability of results—especially for selecting and interpreting the hundreds of narrative remarks collected from participants. Progress in this regard might be made by capitalizing on advances made in the context of computerized text search and analysis techniques that underlie sophisticated Web search and "crawler" systems used on the Internet. Of course, some may argue that any such systematization and objectification of respondents' comments destroys the very benefits that open-response formats were developed to achieve. But some movement in this direction might help investigators communicate their findings more convincingly and help public land managers who must justify their actions in an increasingly contentious sociopolitical environment.

Selecting Remarks from Open-Ended Responses

When analyzing data from focus groups and interviews, there are no hard and fast "rules" for selecting which of the hundreds of remarks available should be presented, and much is left to the investigator's discretion and judgment. In addition, there do not appear to be generally agreed upon measures of "reliability" (repeatability between different investigators/analysts) for these types of data. Thus, there may be uncertainty and potential controversy about the outcome of a particular assessment (what was observed), in addition to the uncertainty/controversy about the implications of the findings, which is common to all forms of assessment. A major challenge is to find systematic ways to explore and analyze/interpret open-ended responses to achieve some reasonable degree of repeatability so that conclusions can be unambiguously justified.

Conclusions

Social acceptability is based on individual judgments, which aggregate in one way or another to provide an overall assessment. It is not yet clear what role social acceptability assessments should play in public land management. At one (crass) extreme, social acceptability assessments might only serve political or public relations purposes, appeasing the public without really affecting the land management policies that are implemented. At the other extreme, social acceptability assessments might determine public land management policy, as in a referendum. The literature reviewed here strongly suggests that some intermediate approach is preferred both by managers and by the public, i.e., something more like a partnership between the public and land managers wherein social acceptability is an important and meaningful criterion, but not the ultimate determiner of policy. As part of this partnership, managers would have a responsibility to explain and justify their preferred actions so as to gain social acceptability and needed support for actions. For its part, the public would have to devote the time and attention needed to understand the options and their consequences, including their uncertainties, and show the resolve to continue as an interested and cooperative partner as agreed-upon actions play out over the relatively long time periods required for land management.

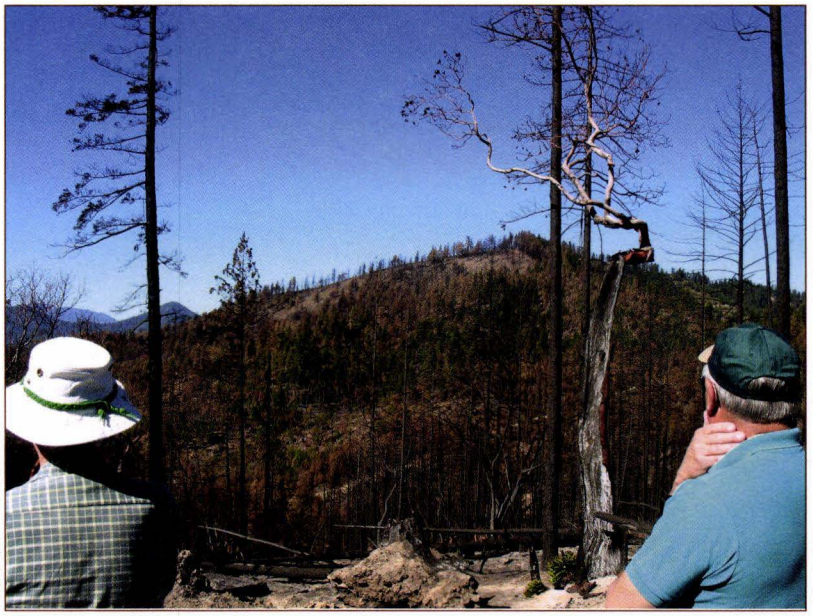

Photo credit: Victoria Sturtevant

Social acceptability is based on individual judgments, which aggregate in one way or another to provide an overall assessment.

Appendix A—Implications of Social Acceptability for Management Actions

After social acceptability has been assessed, the question remains: What effect does that assessment have (or should have) on determining management decisions and actions? In economics, when multiple options with positive utility exist, the option with the greatest utility should be chosen. The relationship between social acceptability and management action is somewhat different, at least as it has been presented in Shindler *et al.* 2002 and related reviews.

In most assessments of social acceptability there is a "zero" point (neutrality) on the acceptability scale, and some assign that point special significance, using it as an "absolute value" for dividing the scale into "acceptable" and "unacceptable" regions. Clearly unacceptable actions should be avoided. One hazard to this approach is that all "acceptable" options may be assumed equal, giving managers little incentive to strive for a better (*more* acceptable) alternative once an option that exceeds the minimum threshold of acceptability is found (analogous to the effects of minimum "standards" for air or water quality).

As acceptability rating scales are applied in practice to individuals, social acceptability is more often taken to be a scale/continuum extending from something like "extremely unacceptable" to "extremely acceptable." When individual social acceptability responses are aggregated, the scale may be defined in terms of the number (percent) of individuals in the aggregated set for whom an action is acceptable (above the "zero" point). Alternatively, the "strength" of individual acceptabilities (as interval scale values) may be taken into account in the aggregation process. Although no one has yet been bold enough to propose it, an action/decision rule consistent with the economic utility and decision-science SEU models would be to always choose the most socially acceptable management option.

Another problem common to assessments of social acceptability is they usually must be done before any of the actions have been implemented and their outcomes actually experienced.

Another problem common to assessments of social acceptability is they usually must be done before any of the actions have been implemented and their outcomes actually experienced. Except in some inventory or monitoring applications, assessments are used to determine which future actions should or should not be taken. Thus, outcomes (and means, procedures, and contexts) for each management alternative (or some idealized single alternative) must be "projected," and it is these future outcomes that must be assessed. A chronic problem for assessments in natural resources management is how to represent what are usually complex alternative futures to the relevant constituents (publics) in ways

that will be meaningful and valid—that is, so that the social acceptability of projected outcomes will be consistent with the social acceptability attained when the outcome is realized. In this context, there is clearly uncertainty in any projection of outcomes in anything as complex as a natural ecosystem—trees may not grow as fast as predicted, soils may erode more or less, extreme/unpredictable disturbances may occur and so on. But even if projected outcomes were perfectly represented and matched the ultimately attained outcomes completely, people may not experience the acceptability they projected they would. That is, neither individuals nor societies can be certain of what they will value (need or want) in the future.

Most economists, decision analysts, and social scientists recognize that the complex political/legal context for natural resource management, coupled with the inescapable uncertainty of outcomes and evaluations, precludes any simplistic approach. Social acceptability advocates, in particular, are more likely to see assessment merging into and intertwined with both the defining of and the choosing of management options, in a process that evolves toward a satisfactory (not necessarily optimum) action based on a temporary and dynamic consensus among stakeholders. The preceding review and synthesis of methods for assessing social acceptability, with an emphasis on applicability to fuels treatments and similar forest management actions, should be viewed against this admittedly oversimplified conceptual background.

Appendix B—Comparison of Visual and Verbal Representations

A study by Tahvanainen *et al.* (2001) addressed the acceptability of specific forest treatments and provides a direct comparison of verbal and visual representations. The study assessed the effects of forest treatments on the judged scenic beauty and recreational quality of forest landscapes in southwestern Finland. The area features oak forests, as well as some pine, mixed conifer, birch, and species exotic to the area. Five landscape scenes were selected for study, ranging from a close view of dense woodland to an open view across a field/meadow to a distant forest stand. Some scenes depicted relatively "natural" conditions and others showed cultural modifications. Researchers then used image processing techniques to create simulations of the effects of five different forest treatments: a small clearcut with logging debris removed, a thinning with logging debris removed, an undergrowth removal treatment, a natural condition (projecting conditions at each site after 50 years without disturbance) and a cultural modification condition (pasture, grazing) on each of these landscape themes. Participants viewed the original landscape images and the simulated-treatment versions of each in (53) pairs and rated which member of each pair was most scenically attractive and by how much. The pairs were then viewed a second time by the same respondents and rated for relative recreational quality. Finally, the five original scenes were shown one at a time and the same respondents indicated how they thought each of the five treatments, represented verbally (e.g., "a small clear-cut," "a thinning," "natural condition"), would affect the scenic beauty and the recreational quality of the original sites (using a 7-point rating scale, *very negatively–very positively*).

Perceptions based on verbal representations were very different from perceptions based on visuals.

Depending on the type and condition of the original scene, treatments were sometimes judged to have improved and sometimes to have degraded scenic and recreational values. For current purposes, the most important result was the comparison between assessments based on visual and verbal representations. The author summarized the results in this regard as "The (verbal-based) preconceptions differed greatly from the visual perceptions..." (Tahvanainen *et al.* 2001: 64). For example, when represented by visual images, the small clearcut significantly improved scenic beauty ratings (relative to the original conditions) while estimates based on the verbal representation of the same treatment indicated that scenic beauty would substantially decrease. For the recreational quality judgments, "Preconceptions concerning thinning and removal of undergrowth were slightly more negative than the visual perceptions" (Tahvanainen *et al.* 2001: 65).

If visual and verbal representations of the same treatment produce different social acceptability assessments (as in the Tahvanainen *et al.* study), it raises the question of which, if either, result is

correct. It would seem that a straightforward way to answer this question would be to take people out in the field and show them the actual treated site and then determine which representation comes closest to the onsite assessment. Indeed, as noted above, a number of studies have shown that scenic beauty judgments of photographic representations do correspond well to onsite judgments of the same landscapes. But it is not clear that this would have been true for the particular sites and simulated treatments assessed by Tahavanainen *et al.* Moreover, as indicated at the beginning of this section, onsite assessments do not always work out as it seems they should.

A study by Johnson *et al.* (1994) used a creative approach in a study that provides further insight into this problem. In this study, people rated color photographs of forest treatments in Douglas-fir forests in eastern Oregon representing the following treatments: clearcutting, commercial thinning, group selection, and two-story harvests. Judgments of scenic quality were used as an indicator of the acceptability of the treatments. These color photographs were created using an earlier version of computer image processing techniques to carefully simulate the targeted treatments in the undisturbed base scenes. Consistent with many other studies, quality/acceptability ratings of these "unspecified forest settings" relative to the undisturbed mature forest condition, were lowest for clearcuts, followed by group selection and two-story harvests. Thinning was rated as the most acceptable of the treatments. The important twist in this study was that a second set of ratings was collected in which the setting for the scenes/treatments judged was the view from the respondent's own home. Photographs were taken from each respondent's property so that segments of the home, or clearly recognized outbuildings, could be identified in the view. Image processing techniques were applied again to introduce each of the four target treatments into each respondent's view of what was an essentially undisturbed mature forest stand. As in the Brown *et al.* (1988) study, scenic beauty/acceptability ratings of forest scenes viewed from the residence showed essentially the same ranking pattern of treatments as when the settings were unspecified, but all four treatments were now rated as significantly less acceptable. Again, the acceptability of forest conditions seems to be strongly affected by whether it is "your forest" that is being assessed.

... the acceptability of forest conditions seems to be strongly affected by whether it is "your forest" that is being assessed.

Appendix C—Verbal Representation - A National Survey

The substantial national telephone survey supporting the USDA Forest Service Strategic Plan Revision for 2000 (Shields *et al.* 2002) illustrates some key features of verbal representation methods. The "VOBA" portion of the *National Survey on Recreation and the Environment* assessed public Values, Objectives, Beliefs, and Attitudes relevant to the management of public forests and grasslands. Over 7,000 randomly sampled individuals from throughout the continental U.S. participated in the survey. The VOBA assessment was composed of 115 questions/statements; each respondent was assigned to answer only a subset.

The Objectives portion of the VOBA is most directly relevant to social acceptability assessments for fuels treatments. The objectives assessed in the survey spanned a wide range of possible forest management policies and actions. Neither geographic locations, forest/grassland types, nor any details of outcomes or procedures were indicated in any of the objectives statements. The objectives section of the questionnaire included 30 items representing possible goals/objectives for managing public forests and grasslands. Individuals rated these items for their importance using a 5-point scale that ranged from "very important" to "very unimportant." Example Objectives (their appendix C) include

1. *Expanding access for motorized off-highway vehicles on forests and grasslands (for example snowmobiling or 4-wheel driving).*
9. *Protecting ecosystems and wildlife habitats.*
21. *Informing the public on the potential environmental impacts of all uses associated with forests and grasslands.*
28. *Paying an entry fee that goes to support public land.*

Paralleling these Objectives were 30 items assessing public Beliefs about the role of the Forest Service in attaining the objectives (5-point scale, *strongly disagree–strongly agree*) and 30 items assessing Attitudes toward the job the Forest Service was doing with respect to the objectives (5-point scale, very unfavorable-very favorable). An additional 25 items assessed relevant Values, such as:

1. *People should be more concerned about how our public lands are used.*
5. *The whole pollution issue has never upset me too much since I feel that it's somewhat overrated.*
15. *Forests have a right to exist for their own sake, regardless of human concerns and uses. (their appendix B)*

The rationale for including assessments of values, beliefs, and attitudes is based on the theoretical assumption that the acceptability of alternative management policies depends upon these more basic

psychological factors. That is, a person's response to a particular forest management policy or action is thought to depend upon basic held values relevant to human-nature relations, relevant knowledge, and beliefs about forest ecosystems and their management and more specific attitudes toward aspects of policies offered for assessment (Barro *et al.* 1996, Bright *et al.* 2002, Bright and Manfredo 1995, McFarlane and Boxall 2003, Tarrant and Cordell 1997, Tarrant and Green 1999, Vaske and Donnelly 1999, Vining *et al.* 1984). General beliefs and attitudes about the agency responsible for carrying out the management activities are also important, and the Shields *et al.* report devotes considerable space to discussing the effect of "familiarity with the Forest Service" on participants responses to the objectives assessed.

Appendix D—Relationships Between Personal Attributes and Assessments of Forest Management

Values, Attitudes, and Behaviors

In Alberta, Canada, McFarlane and Boxall (2000) conducted a mail survey of 800+ campers and 1,800+ hunters to examine the relationships between people's values, attitudes, and behaviors. Values were assessed by looking at *agree-disagree* responses to a series of statements representing biocentric to anthropocentric views. Similarly, attitudes toward forest management were assessed enabling researchers to "locate" individuals along a continuum from preservation to use. Knowledge was assessed by questions from a forest and forestry practices game, called "Treevia." Finally, traditional socioeconomic and demographic variables were recorded, as well as *social influence* variables, such as whether a member of the household depended on the forest industry for his/her livelihood or was a member of a conservation-related organization. Results showed hunters and campers did not differ substantially, and both groups scored toward the biocentric end of the values scale and toward the preservation end of the attitudes toward forest management scale. Both groups were also quite knowledgeable about forests and forestry, getting an average of 66 percent of Treevia questions correct. Socioeconomic and demographic variables (e.g., age, education, gender) were found to account for very little of the variance (2 to 7 percent in the models reported). Environmental value variables fared much better, accounting in the aggregate for about 40 percent of attitude variance. "Only one social influence variable was associated with attitudes. Those who had a household member dependent on the forest sector for their economic livelihood were more supportive of current management, economic development, and timber-oriented management" (p. 657).

Values were assessed by looking at agree-disagree responses to a series of statements representing biocentric to anthropocentric views.

Values were found to have the strongest effect on expressed attitudes, leading the authors to conclude, "Our results suggest that attitudes (toward forest management) are more value driven regardless of socioeconomic status, association with environmental organizations, forest-sector dependence, or level of knowledge" (p. 659). That is, expressed environmental/forest values, especially along the biocentric and anthropocentric axes, were the major determiners of attitudes toward forest management options, and these value orientations cut right across the other sociodemographic, social influence, knowledge, and belief variables.

Another mail survey of 950+ residents of the Front Range in Colorado (Vaske and Donnelly 1999) also focused on the relationship between values, attitudes, and behaviors. This study assessed general

biocentric and anthropocentric values (based on *agree-disagree* ratings for items such as "Forests have value whether people are present or not" versus "Forests are valuable only if they produce jobs and income for people"). Specific attitudes toward forest management policies were assessed by rated feelings, *positive-negative*, toward items such as "...expanding the amount of congressionally designated wilderness." The expressed values and attitudes were related to a measure of behavioral intentions, specifically the participant's rating of how likely he/she would be to vote for forest management policies, e.g., how *likely-unlikely* to vote for "Expand the amount of congressionally designated wilderness." Consistent with the McFarlane and Boxall (2000) study and a "cognitive hierarchy model," a structural equation analysis indicated that biocentric values were strongly related to preservation attitudes, which in turn were strongly related to intentions to vote for preservation management policies (p. 533). That is, people who agreed that forests are valuable in their own right, and who reported positive feelings toward expanding wilderness, also reported that they would be likely to vote for expanding wilderness. This is not altogether a surprising result and raises a concern that observed relationships in such verbal surveys may reflect rules of language/semantics as much as facts about human attitudes and behavior. To agree with an environmental value statement and express positive feelings about a directly related environmental policy and then NOT express intent to vote for said policy would seem, on the face of it, to be flagrantly inconsistent.

Sociodemographic variables did not show substantial effects on levels of acceptance of the range of fire management policies assessed.

Knowledge/Information and Assessments

Acceptance of prescribed fire as a management option in national forests was assessed in a study by Gardner *et al.* (1985). The 1,600+ participants for the mail survey were sampled through nine groups assumed to represent different attitudes toward prescribed fire, ranging from members of the Sierra Club to fly fishermen to off-road vehicle users to professional foresters. The usual set of sociodemographic variables were recorded, with some showing statistically significant (but generally very small) effects on assessed knowledge and beliefs about low-intensity forest fires and on risk tolerance (for escaped fires). Sociodemographic variables did not show substantial effects on levels of acceptance of the range of fire management policies assessed. Group membership (especially professional foresters versus others) and knowledge, beliefs, and risk tolerance toward fire showed the strongest influences on acceptance of different fire management policies. In general, greater knowledge, more accurate beliefs, and higher risk tolerance were all intercorrelated, and in turn were associated with greater acceptance of flexible fire management policies. A compelling conclusion from this and a number of related studies is that

greater public acceptance of fire management policies might be achieved by providing information about fire and fire effects.

But providing people with information has not had consistent effects on environmental values and behaviors (Barro *et al.* 1996, Bright and Manfredo 1997, Brunson and Reiter 1996, Kearney 2001, Loomis *et al.* 2001, Taylor and Daniel 1984). Taylor and Daniel (1984) studied the effects of fire-information brochures on evaluations (acceptance) of prescribed management policies. After reading illustrated brochures describing low-intensity fires, including the generally low damage and potential ecological benefits of such fires in ponderosa pine forests, participants showed significantly increased knowledge of fire effects and expressed more positive (tolerant) attitudes toward prescribed fire, compared to participants who were given only "general forest information" brochures. However, within the same study and with the same participants, the fire information brochures did not affect ratings of either scenic beauty or recreational quality of differentially fire-affected forests represented by photographs. This observed lack of effects of information on perceptions of scenic beauty and recreation quality raises a concern about how well information will influence actual environmental experience and behavior.

This observed lack of effects of information on perceptions of scenic beauty and recreation quality raises a concern about how well information will influence actual environmental experience and behavior.

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KEY WORDS: indicators, proxies, monitoring

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